

A GUIDE TO NATURE-PRINTING

BUTTERFLIES AND MOTHS

BY

A. M. C.

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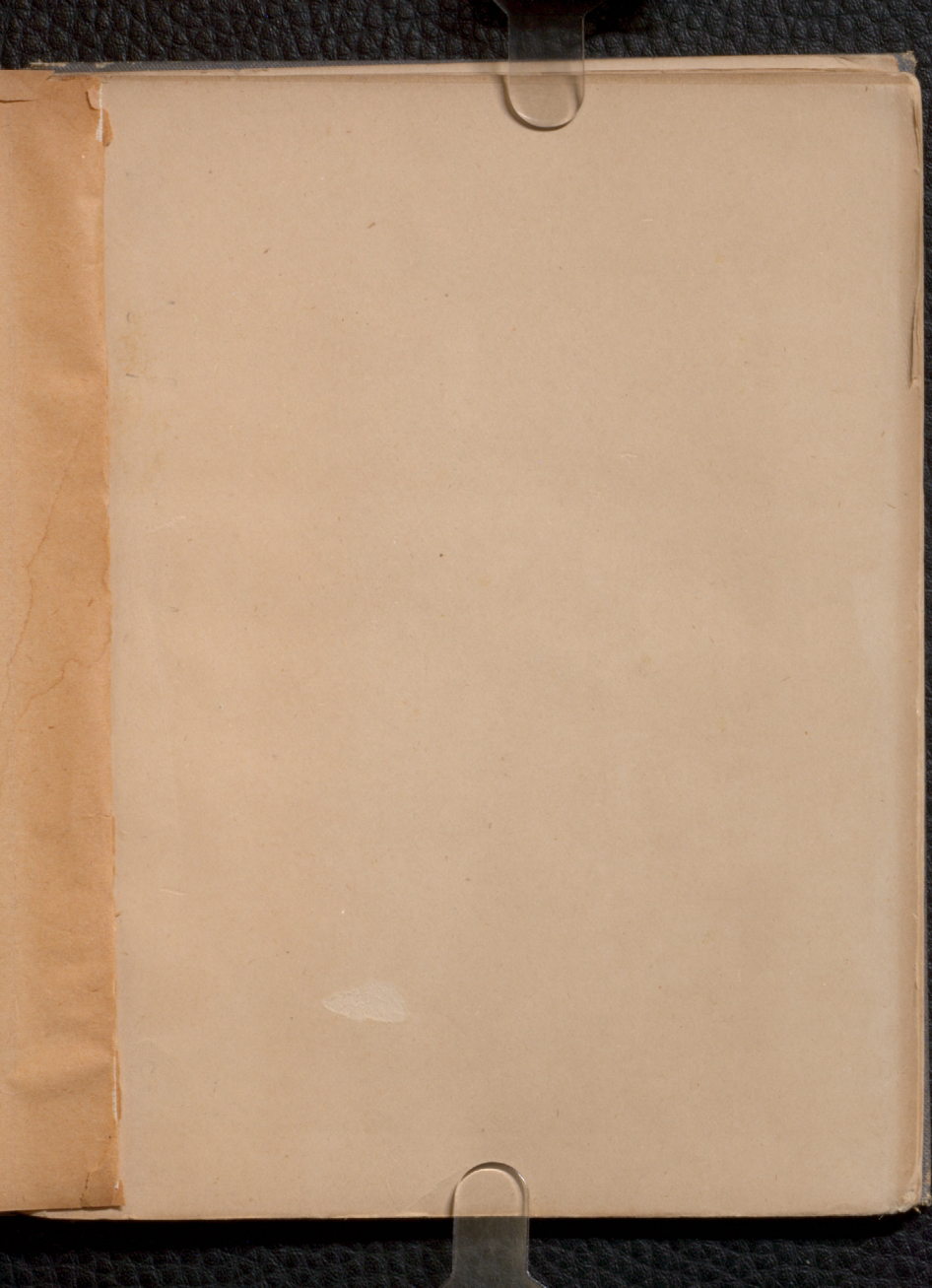
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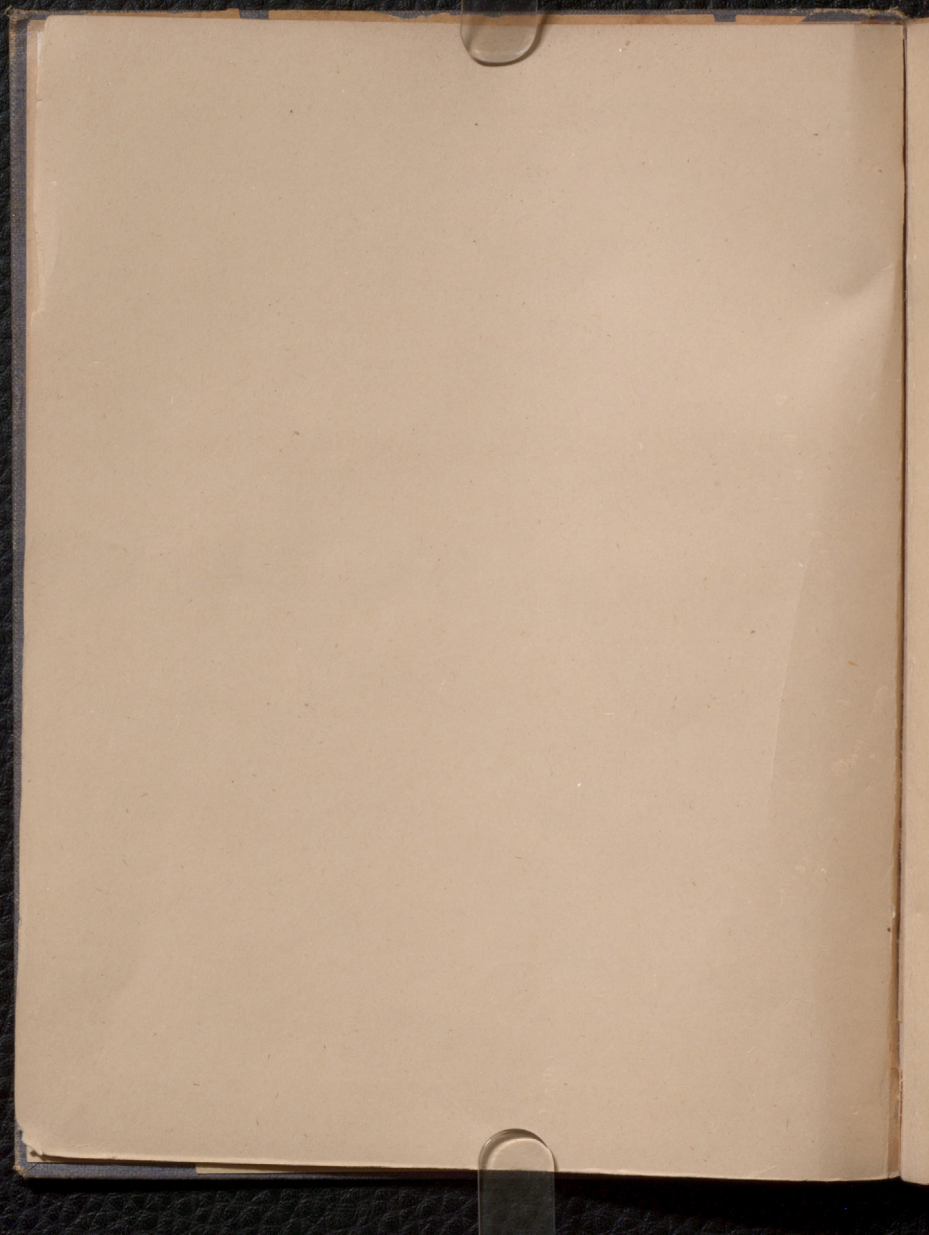
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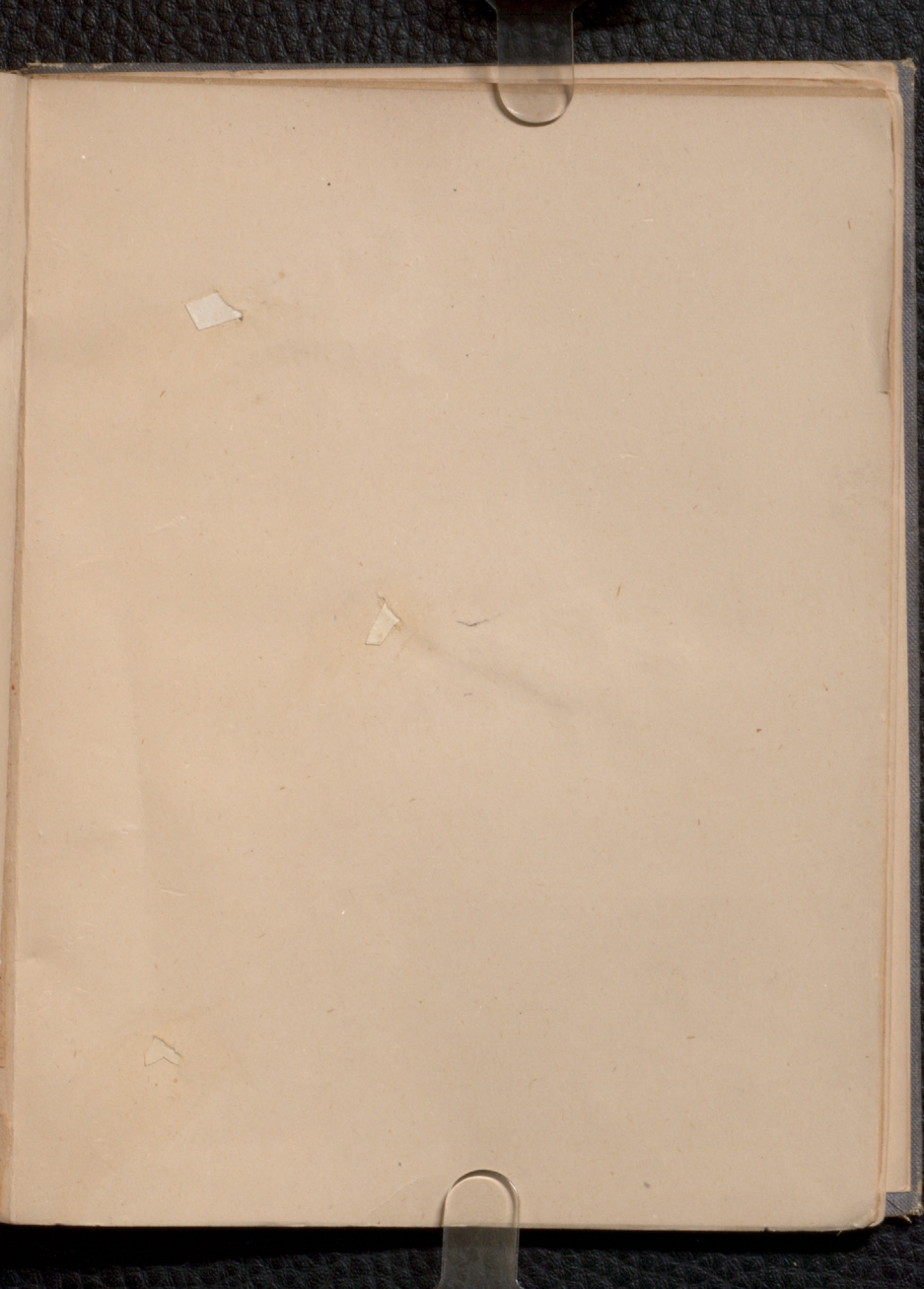
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A

GUIDE TO NATURE-PRINTING
BUTTERFLIES AND MOTHS,

BY

A. M. C.

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HARRISON, 59, PALL MALL,

Bookseller to the Queen and H.B.H. the Prince of Wales.

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INTRODUCTION.

It will be readily admitted that amongst the many beautiful objects in Nature, none is more lovely than a Butterfly. But the naturalist, who desires to form a collection of these "floating flowers," knows only too well, or will soon learn by sad experience, how troublesome a task awaits him. A Butterfly, or a Moth, however large, cannot be skinned like a bird and have the skin packed away until required. Nor can it be bottled in spirit like a snake or scorpion, corked down, and thus at once prepared for its place in the collection. Neither can a Butterfly or Moth be pressed between the leaves of a book like a flower or a fern, and by this means be kept until a convenient season in which it may be spread out and properly arranged.

No: the Butterfly must be "set up" as soon after its death as possible, or it becomes fixed in an undesirable form; it must have space also around it, and not be pressed upon, even by another Butterfly, or it runs a risk of being broken, or of having the scales rubbed off. Then, when properly "set up" in its own place, and in its own box or drawer, the latter must either be hermetically sealed round every chink, to prevent the possibility of other insects finding ingress, or, a constant

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watch must be kept up lest some of the minute creatures which are ever on the look-out for an opportunity of establishing themselves in animal matter, should breed amongst the bodies and destroy the collection.

In the processes presently described for Nature-printing Butterflies and Moths, all these disadvantages are obviated. The collector may form his collection and carry it about in as small a space as would be occupied by drawings of the same objects, whilst the accuracy of every line and mark, the delicacy of the shading, the brilliancy of the hues, and the metallic sheen which appears on the wings of many of the tribe, is at the same time reproduced, and preserved to a degree which is impossible in even the most carefully drawn and highly finished painting; and the time and labour required are as much less as the result is greater.

THE OLD FRENCH PROCESS.

The idea of Nature-printing Butterflies and Moths is by no means new, although, so far as we are aware, it has not hitherto been brought to perfection. The French missionaries in India had a recipe, many years ago, for "transferring" the wings of Butterflies. In substance it was as follows:—

"Smear a piece of paper with a mixture formed of honey, gum arabic, and a little salt. Place the wings of a Butterfly upon the paper, and press another smeared paper very firmly down upon them."

The directions for the mixture were, however, too

vague to admit of a good result being attained with certainty, and the following processes which have been successfully used in printing all the Butterflies and Moths in the appended list, and also for the specimen wings on the Frontispiece, will be found simpler and more effective.

THE GUM PROCESS.

This is upon the whole the most simple of the processes, and also, as a general rule, the most certain in its results.

Of the brilliant green and blue Butterflies we will speak later. They require a different treatment altogether, and it is useless to attempt printing them by any of the methods employed upon red, orange, yellow, brown, white, or black Butterflies and Moths. These colours may be printed upon any or all of the following mediums with safety, and if carefully handled the result should be perfectly successful.

MATERIALS REQUIRED FOR THE GUM PROCESS.

Gum Arabic,—the very best *and clearest* which can be had.

White Paper.—The *unglazed* "Baskerville vellum-wove" answers the purpose best, from being smooth and fine in texture, and at the same time very tough. But any good paper will do.

A "Dub"—made of wash-leather or linen, filled with cotton-wool. The dub should be quite firm, but not too

hard ; and enough of the leather or linen should be left to form a good handle.

Scissors, and with sharp, strong points.

A piece of mill-board.

A "Rubber," for which almost anything may be used. A ball of glass or crystal, large enough to be held comfortably in the hand is the best, as being perfectly smooth ; but the handle of an ivory paper-knife, or brush, or even the bowl of a silver spoon will answer the purpose on emergency.

Method.—Dissolve some of the gum to a consistency thicker than is required for ordinary use, but still quite liquid, and take particular care to have no grit or dirt of any kind in it.

Place a half-sheet of paper on the mill-board. Half a sheet is better than a whole one, and for beginners a quarter of a sheet would be better still, as enabling the printer to spread the gum with greater evenness over the whole surface. Fold the paper in half, and press it at the fold. Then open it out and pour a few drops of gum on to the middle of it. Then with the finger rub the gum well into the paper all over its surface. The gum must be rubbed in until the finger will hardly travel over the paper. This will take a minute or two if the gum is of the proper consistency, but trouble must not be spared, for upon the right preparation of the paper depends the success of the impression.

Before preparing the paper the wings should have been cut off the bodies of the butterflies or moths with a pair of sharp, strong-pointed scissors. They should be

cut at the joint, which is easily found, and handled lightly to avoid rubbing off the scales.

Now lay, on the prepared paper, on one side of the fold only, as many wings as can be arranged without touching one another. Fold the blank side down upon them, and with the dub press each wing, and dub the whole surface until the paper is everywhere stuck together.

Lift the paper off the mill-board with a paper-knife, and place it on a smooth *and steady* table (marble is the best), and proceed to rub it hard with whatever is being used as a rubber. It is better to place a piece of dry paper over the impression whilst rubbing, as it absorbs the moisture and prevents the risk of rubbing the paper into holes, which sometimes occurs if the Butterfly or Moth is large with strong bones, through the damp of the gum softening the paper.

The rubbing should be continued on both sides until the paper presents a glazed surface, with no lines or stripes upon it. Then, by beginning at one corner, a strong, slow, steady pull will bring the paper apart, and show the impression of either side of the wing upon either side of the paper.

If these directions have been properly carried out, the membrane should now appear entirely divested of scales, and looking like a fly's wing. It will probably adhere in some parts closely to the impression, though sometimes the perfect membrane falls away as the paper is opened. When this is not the case a good portion of it may be blown away at once, and the remainder may be

easily lifted off with a sharp-pointed penknife when the gum is quite dry.

The cutting out of the wings must also be left until the paper is perfectly dry, for if cut whilst damp, the edges would lose their sharpness of outline.

TO PROCURE PERFECT SPECIMENS.

A collector naturally endeavours to procure specimens as perfect as possible; and the best means of ensuring this is to get either the caterpillars or the cocoons, and, suspending them in a cage made of a light framework of wood walled with muslin, watch for the birth of the Butterfly or Moth. Its rapid development is interesting and wonderful to observe, but when fully attained the specimen should be killed at once, in order to preserve the bloom on the wings in perfect beauty.

BEST METHOD OF KILLING SPECIMENS.

Poison.—The quickest, and therefore the most merciful, method of killing the larger specimens is by poison.

Cyanide of potassium is the most efficacious; but so deadly is this poison, that there is great risk of disaster should it fall into the hands of ignorant persons or of children. It is well, therefore, if this poison is to be used, to procure one of the jars now made for naturalists, in which the poison is placed at the bottom, and over the poison a layer of plaster of Paris is run, which, being porous, admits of the fumes passing through and

acting upon the insect, while at the same time it confines the poison itself to one place. For those who have not one of these jars, but who wish to use the cyanide, the best plan is to procure a wide-mouthed jar, fitted with a patent air-tight stopper, and to lay over the poison at the bottom of the jar several folds of blotting-paper. These will to some extent answer the same purpose as the plaster of Paris; that is, they will permit the fumes to pass through, and will at the same time absorb part of the moisture, which would otherwise damp and spoil the wings were they brought into actual contact with the cyanide.

Sunstroke.—In a tropical climate another very speedy method of killing large specimens is by sunstroke.

To effect this, place the Butterfly or Moth under a glass in the sun, and it will be quite dead in a few moments. This, however, requires watching, for should they be left too long the wings would become dry and shrivelled through the excessive heat, and would require to be relaxed by a somewhat troublesome process, which it is as well to avoid if possible. This process is necessary when the specimens have had the wings folded together, and have been kept thus until quite stiff and dry, and is as follows:—

Get a piece of cork about $1\frac{1}{2}$ inch square, and pin on to it the specimen the wings of which are to be relaxed. Float the cork in a basin or soup plate of boiling water, and the joints will soon be found supple. Failing a square bit of cork, a piece of perforated cardboard may be pinned on to any cork which is at hand, and the

specimen fastened on the cardboard, and floated on the boiling water.

Suffocation.—Small specimens may be killed almost instantaneously by firm pressure of the thorax between the thumb and forefinger. If held steadily and firmly, the body receives no damage.

PAINTING OUT DEFECTS.

When the page of impressions is thoroughly dry, and before the wings are cut out, is the time to remedy any defects or deficiencies which may be apparent.

As a rule, any injury to the scales (*feathers* some choose to call them) or to the edges of the wings, will have been observed before the impression has been taken. But it is wise for the printer to cultivate a habit of careful examination before separating the wings from the body of the insect. The minute differences which appear in varieties of the same class will thus be observed, and the chances will be lessened of a natural spot or mark (which may perhaps be the distinguishing mark of the variety) being mistaken for a defect in the print, and *vice versâ*. Were the entire surface of the membrane invariably covered by scales, this doubt would perhaps seldom be raised; but this is by no means the case, as we shall see later on.

Another habit, to which the collector will do well to accustom himself, is that of never printing *both* the anterior and *both* the posterior wings on the same paper. Of course in the case of common specimens,

where there is no question as to duplicates, this custom need not be followed. But even then, as persons in general are slaves to habit, we would advise it, in order that it may come as the natural method of procedure when rare and unique specimens are being printed. The best plan is to print one anterior and one posterior wing, and then to compare the impression with the remaining natural wings, paint in from the latter any faults or defects which are observable, and thus make sure of one perfect side, by which the second print may in like manner be rectified, should it also appear in any way defective.

A touch of ordinary water-colour used with a little ox-gall, is all that is necessary, and this, with fairly good specimens, is very seldom required, excepting when, as sometimes happens, the scales having been rubbed off the bones, the latter appear in the impression white instead of coloured, as they will be seen in Nature when the print is compared with the real wings.

COLOURED MEMBRANES.

We have said that the membrane is not invariably covered; and there are many Butterflies and Moths in which this absence of scales from portions of the membrane occurs, notably in the *Papilio Sarpedon* and *Papilio Agamemnon*, and other members of the same family. In the case of these Butterflies the uncovered membrane gives the colour and brilliancy, the scales being in general pure black or very dark brown.

In the case of the *Danaïs Septentrionis* (another specimen the colour of which is only on the membrane), the difficulty in obtaining an exact impression is not great, for the blue of the membrane is easily matched in paper, and a print taken off upon paper of that colour, and slightly darkened afterwards where necessary, is as nearly perfect as possible. But with the *Papilio Sarpedon*, more than with any other we know, the case is different. There is no paper, so far as we have been able to discover, which in any degree approaches the brilliant hue of the stripe across the wings of this specimen. Moreover, the stripe is shaded into a variety of tints, which it would be quite impossible to render upon paper of an even tone throughout. The most brilliant illuminating colours fail to convey an adequate idea of the natural hue, and look dull and pale when placed in juxtaposition with the real wings. The only remedy, therefore, in this case is carefully and delicately to cut out the coloured portions of the membrane after the print has been taken and is dry, and to gum each one very exactly into its own place, which will be found a white blank on the print.

There is yet another difficulty with regard to coloured membranes to be noticed. It will be found that some Butterflies,—such for instance as the *Catopsilia pyranthe* and *Papilio nomius*,—which appear of a pale greenish or bluish tint, derive their colour solely from the membrane which shows through and affects the white or yellowish scales. If such Butterflies as these are printed upon white paper, the impression will not convey a correct idea

of the colour of the original. The print should therefore be made upon paper the colour of the membrane. To ensure this being exact, one wing should be printed off, and the paper matched against the bare membrane which is left. The white or yellowish scales printed off upon well-matched paper, produce the exact effect required.

We shall mention another way of procuring successful prints of these specimens when treating of the blue and green Butterflies.

CUTTING OUT AND MOUNTING.

It now only remains to cut out the wings, and to mount them upon the paper on which the body is to be painted. The cutting out must be done with extreme neatness, and the bodies and antennæ should be painted in with great care and accuracy. Upon this depends much of the value of the collection from a naturalist's point of view, for in many cases the shape and colour of the antennæ determine the class or family to which the specimen belongs.

IMPRESSIONS TAKEN UPON THIN OR INFERIOR PAPER.

It sometimes happens that, from the delicacy and transparency of the real wings, a thin paper must be used in order to obtain a fac-simile of their texture as well as colouring. Or it may be that good paper is not at hand when a Butterfly or Moth could be printed,

and that it has to be taken off upon inferior paper. In either of these cases it is better to leave the sheet after it has been rubbed, until it is perfectly dry, and then, by holding it up to the light, the outline can be clearly seen and accurately cut. It must be cut *quite close*, and the edges separated with a sharp penknife, beginning at the bone where it joins the body.

OTHER PROCESSES.

We will now describe other processes, which answer with varying success for all Butterflies and Moths except the green and blue ones, of which, as we have already said, we shall treat separately. It must be understood that the cutting out and mounting is the same in every process.

The Wax Process.—The only advantage which the wax process possesses over the gum, is that the paper may be prepared beforehand, so that when the collector is travelling, or with but little time at his disposal, he has nothing to do except rub off his impressions. Against this, however, is the fact that the wax renders the paper semi-transparent, and thus destroys the brilliancy of the lighter shades and of the white in the impressions.

Mode of Preparation.—Melt some pure white wax over a spirit lamp. Have ready two dubs, made of white linen, stuffed with cotton-wool. Place a half-sheet of white paper upon a hot plate, or any other smooth, flat surface which will retain heat for some time. When

the wax is perfectly liquid, dip in one of the dubs, and pass it evenly and regularly over the paper. There must be sufficient heat below the paper to keep the wax oily; it must never be allowed to harden anywhere. When the whole surface of the paper is coated, take the second dub, and, still keeping the paper upon the hot plate, rub off as much of the wax as possible, so that only what has sunk into the paper remains. When this is done, and as much wax as possible has been removed, lay the paper aside until cool, and it is ready for use. A mark should be made at one corner of the paper, to show the right (*i.e.*, waxed) side, before the wax is laid on; otherwise it is difficult to distinguish between the waxed and unwaxed sides, and the impression would be very faulty were the wings printed upon the unwaxed surface.

There are a few Moths, on the wings of which the scales lie so thickly as almost to resemble a fur. The wax process answers well for these, as it allows of a second impression being rubbed off after the first has been taken. The first impression is often blurred, on account of the fluffiness of the scales, while the second comes off perfectly. The first should not be rubbed too long, nor with too strong a pressure, as the object is not to get the impression, but to remove the superfluous scales.

Rice-water Process.—Prints taken off with rice-water as a medium, are, perhaps, more perfect than any others, *when they succeed*. The rice-water is more absolutely colourless than any of the other substances used, and

possessing no glaze of its own, the beautiful sheen on the underside of the scales, is transferred in greater perfection than with any other medium. But rice-water so far softens the paper that it will not bear rubbing, and the only substitute is heavy pressure. A small screw press is portable enough, but the pressure is, in many instances, insufficient to remove the scales from the whole surface of the wing. If the latter happens to be very thin and delicate in texture, *e.g.*, the *Micromia caudata*, or the *Abraxas fasciaria*, the rice-water process answers admirably; but where the bones are large, it often happens that near the body where the bones stand up above the membranes, the scales are not transferred at all, and thus the impression is either imperfect, or altogether spoilt.

The rice-water is prepared by boiling down a small spoonful of rice, until it is of the consistency and has the appearance of barley-water. The best rice should be used, and it should be thoroughly washed before boiling. It may be used either hot or cold, and will keep for three or four days.

The rice-water should be laid on the paper like paste, with a brush worked up and down, and backwards and forwards, until a perfectly even surface, free from stripes or ridges, is produced. Lay the wings upon this, fold down the paper, dub it to keep the wings in their places, and to make the two sides of the paper adhere together, and then put the sheet into the press, between a single sheet of blotting-paper, to absorb the moisture. Screw the press as tightly as possible, and

leave it for about an hour. Should any delay occur in opening out the sheet of impressions, no harm will be done, but no attempt must then be made to pull the paper apart. It must be held to the light, and each wing cut round, as described under other circumstances at page 13—14.

It should be remembered that the paper must always be folded and re-opened before the medium is laid on. Also, that the more lightly, and at the same time firmly, the wings are handled the better. Also, that when they have once been laid on the paper, care should be taken not to remove them by even a hair's breadth, or there is a risk of the impression being blurred. Folding the paper before preparing it greatly lessens this risk.

White of Egg Process.—If a medium is required at a moment's notice, white of egg may be used. It should have a drop or two of water poured on it, and be then beaten a little with a fork, after which it should be brushed on to the paper in exactly the same way as the rice-water. No attempt must, however, be made to pull paper prepared with white of egg apart, as the adhesion is so strong that the paper invariably tears. The impression should be subjected to heavy pressure, and then when dry the wings should be cut out.

Varnish Process.—This is a useful process for those Butterflies and Moths the scales of which are close-grained, and adhere very tightly to the membrane, requiring strong rubbing to bring them off. As the varnish does not damp, and thus soften the paper, the rubbing may be as hard as on waxed paper, while at the

same time the natural sheen is much more perfectly preserved. The varnished paper, however, is not of the same use to the traveller as the waxed paper might prove to be, for it can only be used at a certain stage of its preparation, and cannot be conveniently carried in a small compass.

The best varnish to use is either pale copal or mastic. It should be brushed over and *into* the paper, which has been previously warmed, with a hog's-hair brush, and then smoothed to a perfectly even surface with a flat "sky-brush" of camel's hair. The coating of varnish should be *as thin as possible*, consistently with its covering the entire surface of the paper. It should then be left until it becomes what is technically termed "tacky," *i.e.*, when the finger if dabbed lightly upon it will not stick, though it will do so if pressed down upon it. The length of time which this will take depends upon the state of the weather and the heat of the room in which the paper is prepared.

BLUE AND GREEN BUTTERFLIES.

We have now to the best of our belief given every possible direction which is necessary for securing perfect prints of all, except the blue and green Butterflies and Moths. Even an inexperienced hand will find success attend him if he follows them, but this he must do with attention and care, for they are the result of many experiments and many failures, and have all been

proved before being recommended. Let the collector, however, beware of trying any of the foregoing recipes upon blue or green specimens. He would find nothing but disappointment await him, and it was only after repeated trials, resulting in repeated failures, had been made, that the following process was worked out. It will, however, now be found perfectly successful, and most satisfactory in its results.

The *Papilio Arcturus* may be taken as an example. It is one of the most beautiful of Butterflies, and one which it is quite impossible to print off successfully upon paper. The brilliant metallic green spots with which the anterior wings are sprinkled, as with dust, and the exquisite patches of colour (varying from a turquoise-blue to a deep mauve, according to the light in which the Butterfly is held) upon the posterior wings are completely lost in an impression taken upon paper, and for the following reason. The beautiful colour is due to the *grooving* of the scales, which causes the variety in the hue, according to the way in which the light falls, and not to any real variety in the tint.

It will, therefore, be understood that the colour is a *surface* colour, depending upon the way in which the light rests on the scales, and not a colour which dyes the scales throughout, like the yellows and reds of other specimens: consequently when the wing is, so to speak, turned inside out, *i.e.*, when the under side instead of the upper side of the scales is seen, the former shows none of the peculiar iridescence of the latter. The object therefore is to find a *transparent* substance on to

which the scales may be transferred, so that the right side, instead of the wrong side, may be seen.

We may perhaps be able to put this more clearly. Suppose that a person takes two gloves, one made of silk, and the other of kid, of the same colour, and that he puts a glove upon either hand. Suppose him then to press his hands upon a board on which is some substance so adhesive that when he withdraws his hands, the gloves are torn away, and remain stuck to the board with the inside only visible. The silken glove would appear much the same as when upon the wearer's hand; but very little idea would be conveyed of the colour of the kid from seeing only its inner surface. Now, suppose that instead of being spread upon a board, the adhesive substance is laid upon glass, or something equally transparent. When the hand is removed, the glass would be turned over, and the kid glove would then show its real colour, only looked at through a film of glass.

Having arrived at the conclusion that the film must be put up with, for the sake of obtaining the true colour, the next difficulty was to find a substance which would absorb the necessary medium, and also bear the amount of pressure or rubbing requisite to bring off the scales and fix them on the said substance. Glass and talc proved useless, horn was not sufficiently transparent, the ordinary gelatine used by confectioners and chemists was so easily affected by the weather, that though the impressions were good at the time, yet they could not be depended upon to remain perfect. It is

needless, however, to go through a list of failures; suffice it to say, that step by step has been gained, until we have at length arrived at what we believe we may term perfection.

THE COLLODIO-GELATINE PROCESS.

MATERIALS.

Saturated solution of Beeswax dissolved in Ether.

Collodion.—The collodion must be specially prepared. Any good photographic chemist can make it, only it requires a little time. State when ordering it, that it is wanted for a strong, horny film, which will bear transferring, and that it must be at least double the strength of ordinary collodion.

A small quantity of either common alum in powder, or chrome-alum.

Some of the clearest and best French transparent gelatine.

Prepare a piece of plate-glass, of about 8 inches by $5\frac{1}{2}$ inches, by dabbing over its surface a *very small quantity* of beeswax dissolved in ether. Rub the glass with a linen cloth until it appears brilliantly polished, and then run over it a film of collodion in exactly the same manner as if the glass were being prepared for a photograph; *i.e.*, pour the collodion on to the glass until about half of it is covered; then, holding the plate at opposite corners, move it gently backwards and forwards until the collodion floats over the whole sur-

face, when the superfluous collodion may be poured back into the bottle from one corner.

When the film is perfectly set throughout, a solution of gelatine, which has previously been prepared as follows, must be poured over it.

Soak a small quantity—say $\frac{1}{4}$ oz., which will be enough for several films—in cold water, for at least 24 hours. Take it out of the cold water, and put it into a jar or cup, and pour boiling water upon it, in the proportion of five or six times its own weight. It is easier, however, after a little experience, to judge the quantity of water by the stiffness of the gelatine than by any given measure or weight. When thoroughly melted, stir into the gelatine either chrome-alum in the proportion of 1 per cent., or common alum (powdered) in the proportion of 10 per cent.

The reason for preparing the films with alum is that its action upon gelatine renders the latter insoluble, and consequently the films may subsequently be damped without injury; besides which they remain unaffected by the state of the atmosphere, the extreme sensitiveness to any variation of either climate or temperature being one of the main drawbacks to the use of commonly prepared gelatine. Chrome-alum is the more effectual in its action, but it is more difficult to handle the gelatine thus prepared, the chrome-alum being apt to turn it “ropy” and lumpy.

When the alum has been thoroughly stirred into the gelatine (which will thicken almost immediately), this should be strained through fine muslin into a jug.

And now occurs the only troublesome part of the process. The object being to produce a film of sufficient toughness and strength to bear rubbing and considerable pressure, the gelatine must, like the collodion, be much thicker than would be necessary for an ordinary photographic tissue. Therefore it must not be poured over the collodionized glass until it flows heavily, having cooled down to about the consistency of treacle. But, when in this state, it chills rapidly, and if poured on to the cold glass would rapidly set in a lump of jelly, instead of floating evenly over the whole surface. The plate must therefore be placed over a dish or basin of boiling water, which, however, does not touch it—and the gelatine must be poured on whilst the glass is warm. The plate should be kept as level as possible to insure having the film of an even thickness throughout. If the gelatine will not flow readily it may be guided by means of a small glass rod. When the whole plate has been evenly coated, it must be laid on a level and steady table, and left to harden. This will take some hours. When perfectly set, the film should be so transparent as to render it difficult to detect upon which side of the glass it is.

It is now ready for use, but must be left on the glass-plate, and treated in the following manner:—

When the wings are ready, rub a thin solution of very clear gum arabic over the gelatine, and when it is "tacky" cut through the film with a sharp knife round the edge of *half* the glass. When this has been done the film can be easily raised from the glass with a paper

knife, or piece of card. Now lay the wings on the half which still adheres, and fold the loosened half over them. Dub them well together, and then, laying a piece of paper over the tissue, rub as for gummed paper. When sufficiently rubbed the second half of the tissue must be cut round the edge, and the whole will be easily lifted from the glass.

The gelatine in the jug will become solid when cold, but is easily melted by placing the jug in a basin of boiling water.

Of course films thus prepared would only serve for one who has time and space at his disposal. The tissue is too delicate to bear much rubbing when once detached from the glass, and several plates thus prepared would be both weighty and cumbersome for a traveller. But films may also be prepared upon paper, which, though more troublesome to make, are quite as easily used, and are very convenient when travelling.*

METHOD.

Collodio-Gelatine Films on Paper.—Take half a sheet of thick, highly-glazed paper, and holding it firmly, at one end, upon a marble slab, or polished board, pass evenly and regularly over its surface a piece of pure white wax. When the whole surface appears

* Very good collodio-gelatine films may be bought from the Sciopticon Company, 157, Great Portland Street, the manager of which has taken great pains in preparing them specially for Butterflies. The only disadvantage a collector will discover in not making the films for himself when required is, that by keeping they become brittle, and when folded, or whilst the wings are being cut out, are apt to split and crack.

to have received a coating of the wax, take a white linen dub, and, as in the waxed paper process, proceed to rub off as much of the wax as possible. This, however, requires even more care; for, the wax being cold, clogs the dub, and it is more difficult to rub it down to a perfectly smooth, polished, surface. Great care must also be taken not to crumple the paper, for the film of collodion will not lie smoothly over creases. When the wax has been rubbed off, and the paper presents a highly polished surface, a film of collodion should be run over it, in exactly the same manner as upon the glass plate. Leave the film to set, placing a weight upon each corner of the paper to prevent contraction.

When the collodion is quite dry the paper must be coated with a solution of gelatine, prepared as for the tissues made upon glass. When, however, they are to be on paper, the gelatine must be strained into a flat dish, large enough to hold the collodionised paper without bending. In this dish the gelatine must be left until it is of the proper consistency. The paper must then be taken by a clip at either end (the clips should, if possible, be as long as the paper is broad, to prevent the ends from curling), and passed backwards and forwards, collodion side downwards, over the surface of the gelatine. When as much has been taken up as will remain on the paper without dripping, the paper should be quickly turned, laid on a level board, and tacked round the edges with drawing-pins, to prevent it from curling and contracting whilst

drying. It should not be dried in too warm a room, or the rapid contraction will cause the film to split.

When dry the films are ready for use, and only require a thin solution of the purest gum arabic to be either poured or brushed over them. In a few minutes this will be "tacky," and the wings may be arranged as for any of the other processes, and the papers, after being "dubbed," placed under heavy pressure. After about an hour or two (according to the pressure) they may be taken out of the press; but unless the paper falls off by itself, it is advisable to cut out the wings before attempting to separate the films, or to remove the paper. Even with the most careful preparation a speck of the paper may escape the wax (the use of which is to prevent the collodion from adhering to the paper), and this would cause the film to stick at that point to the paper, the weight of which would certainly tear and spoil a delicate film.

There are some Butterflies, such, for example, as the *Thyca Eucharis*, the colours on the under side of which show through to the upper side. Though the gummed paper transfers these perfectly, so far as the actual colour of the scales is concerned, yet the *effect* is not given. For in Nature the brilliant colour on the under side shines through the membrane, and appears to tinge the scales on the upper side of the wings.

By preparing some films in exactly the same way as those described above, with this exception, that the collodion should be the same as is ordinarily used by photographers, which will render the film much thinner,

these Butterflies may be printed so as exactly to reproduce the natural wing. When the wing is to be cut out a very slight margin of film should be left, instead of the wing being cut quite closely. This tiny margin must, after the membrane has been removed, be delicately touched with india-rubber solution, such as is used by photographers. The two sides of the wing will then be closely united, and the colour of the under side will show through to the upper, in precisely the same degree as it does in Nature.

When recommending that coloured paper should be used for those specimens, the scales of which derive their colour almost entirely from the hue of the membrane, we said that another process should be afterwards described. It is this :—

Take the *Danaïs Septentrionis* as an example. Though the impression taken upon coloured paper, and deepened with paint where necessary, will give a very perfect representation of the Butterfly, yet some persons might prefer, were it possible, to have the actual membrane, as in the case of the *Papilio Sarpedon*. But the *Danaïs Septentrionis* is too much divided and striped to admit of this, and therefore the best thing that they who desire to have the actual membrane can do, is, to print the Butterfly on a thin film, and, leaving a slight margin (as in the case of the *Thyca Eucharis*), touch this with india-rubber solution; in this case, however, *not* removing the membrane previously.

In Southern India the *Danaïs Septentrionis* is one of the commonest Butterflies, and may be seen in thou-

sands, where met with at all; there would therefore be no difficulty in procuring enough to make sure of perfect specimens of both upper and under sides.

Then with such Butterflies as the *Diadema Bolina* and *Diadema Misippus*, the exquisite dark-blue patches upon these specimens are sufficiently well represented upon paper to render any mistake as to their identity impossible; but the paper print is far from conveying a just idea of their beauty, as will be readily acknowledged on comparing prints of these Butterflies taken upon paper with those taken upon gelatine.

It would be easy to multiply instances. But experience will soon teach anyone who intends making a Nature-printed collection what is the best medium to use for his different specimens. It only remains for us to re-urge upon those who intend to pursue this art, the care and nicety with which the specimens should be cut out and mounted. Upon this depends much of their value as a collection. Unless an unquestionable duplicate be at hand, the body should never be thrown away until a copy of it has been carefully sketched in and coloured. The same with the antennæ. Even if broken off they should not be thrown away until they have been examined through a magnifying glass, and their characteristics noted and painted in. Carelessness in painting the antennæ might lead to a Butterfly being placed in a false position altogether with regard to its species, and would under any circumstances greatly lessen the value of the collection.

A. M. C.

LIST OF BUTTERFLIES AND MOTHS WHICH HAVE BEEN
PRINTED SUCCESSFULLY EITHER ON PAPER OR GELATINE.

Abraxas fasciaria
Adolias garuda
 " *lepidea*
Egocera venulia
Aloa lactinia
 " *biguttata*
Anops thetya
Anagnia orbicularis
Antheraea paphia
Aphnaeus etolus
Appias evagete
Argina astraea
 " *syringa*
Argynnis niphe
Artona discivitta
Athyma leucothoe
Atella phalanta
Attacus atlas
Aulocera saraswati

Belenois mesentina

Castalia deridea
Catopsilia pyranthe
 " *catilla*
Catophaga leis
 " *neombo*
Cethosia cyane
 " *mahratta*
Charaxes fabius
Chærocampa thyelia
Chalcosia affinis

Chilo interruptellus
Cirrochroa thais
Cocytodes modesta
Colias nilgiriensis
Curoba sangarida
Cynthia erota
Cyrestis thyodamas

Danaüs septentrionis
 " *chrysippus*
 " *plexippus*
 " *hegesippus*
Deilephila celerio
Dendrox chrysomallas
Deiopeia pulchella
Diadema bolina
 " *missippus*
 " *jacintha*
Digama hearseyana

Ergolis ariadne
Eronia pingasa
Euploea core
 " *coreoides*
Euschema bellona
 " *palmyra*
Eusemia bellatrix

Hebomoia glaucippe
Hesperia kumara
Hymenia recurvalis
Hypanis ilythia

Hypsa marmorea
 " *fuscus*
Hypopyra vespertilis

Idmais amata
Iolaus longinus
Ismene benjamini
Ixias sesia
 " *marianne*

Junonia lemonias
 " *laomedea*
 " *orithyia*
 " *aenone*
 " *almana*

Kallima wardii

Lampides baticus
 " *aelianus*
 " *theophrastus*
Lagoptera honesta
Lethe europa
 " *nilgiriensis*
Limenitis procris

Libythea myrrha

Melanitis ismene
 " *leda*
Messaras erymanthis
Mecyna deprivalis
Mycalesis onatas
Myrina jafra

Nepita anila
Neptis varmona
 " *hordonia*
Nyetipao crepuscularis
Nychitonia nina
Nyctemera lacticiuia

Nyctemera varians

Ophideres fullonica
 " *plana*
 " *materna*
Ornithoptera minos

Papilio clytia
 " *dissimilis*
 " *hector*
 " *aristolochiae*
 " *philoxenus*
 " *coon*
 " *pammon*
 " *romulus*
 " *helenus*
 " *paris*
 " *buddha*
 " *arcturus*
Parthenos virens
Patula macrops
Pergesa acteus
Phakelura indica
Pintia ferrea
Plusia aurifera
Polyommatus akasa
Precis iphita
Protoparce orientalis
Pyrameis cardui
 " *indica*
Pyrgus superna

Remigia archesia
 " *frugalis*

Scolitantides nysens
Sesia hylas
Sospita prunosa
Spilosoma todaria
Symphædra thyelia
Synchlœ gliciria

Syntomis creusa

Telchinia violæ

Terias hecabe

„ drona

Teracolus etrida

„ pallens

„ danæe

Thyca eucharis

„ descombesi

Trigonodes hyppasia

Vanessa charonia

Zemeros flegyas

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